

SBN Far Detector Installation & Integration Safety @ FNAL Overview References

Hazard Analysis

The Job Hazard Analysis is required for each task of installation. It is utilized to list the steps of a task, the hazards that may be present during each step, and the mitigation measures to take to reduce/eliminate the hazard. It must be signed by the preparer, and then reviewed and signed by a second individual. All personnel involved in the task must sign that they have read the hazard analysis.

Hazard analysis form: <http://esh-docdb.fnal.gov/cgi-bin>ShowDocument?docid=1209>

Online database (requires Services username and password): <https://www-bd.fnal.gov/cgi-msd/halIndex.pl>

- [FESHM 2060 – Work Planning and Hazard Analysis](#)

Operational Readiness Clearance

The operational readiness review looks at the installed equipment and its compliance with applicable standards. The review can be scheduled after all equipment is installed (but prior to operations). A review committee will look at all documentation for the installed equipment, then visit the installation to ensure it is installed according to applicable standards (Fermilab Environment, Safety and Health Manual). Below is guidance of the type of documentation that will be needed prior to the start of the review:

Electrical/electronics

- Safety engineering design review documentation
 - Simplified (block) electrical diagram
 - Line diagrams for any custom circuitry or modifications to commercial equipment
- References:
- [Electrical design standards for electronics to be used in experimental apparatus at Fermilab](#)
 - [Electrical safety & Fire/Life safety ORC review tips](#)

Mechanical/structural/lifting fixtures

- Engineering notes (reviewed)

Lasers (Class 3b or Class 4)

- Laser registration form
- Written Standard Operating Procedure (SOP)

Fire/Life Safety

- Combustible materials (foam, plastic, cables, etc.) approved for use by Fire Protection Engineer (contact Jim Priest, send samples for testing).

References:

- [FESHM 2005: Operational Readiness Clearance](#)

Cryogenic system review document requirements

- System design documents
 - Engineering notes
 - Piping and Instrumentation Diagram
- System operating documents
- Safety analysis documents
 - ODH analysis
 - Failure Mode and Effect Analysis (FMEA),
 - What-if analysis,
 - Hazard analysis
- Maintenance documents
 - Lockout/Tagout procedures
- Software (e.g. PLC logic)
 - Software design note
 - Software operator instructions
 - Maintenance plans

References:

- [FESHM 5031: Pressure Vessels](#)
 - Form: [Pressure Vessel Engineering Note](#)
- [FESHM 5031.1: Piping Systems](#)
 - Form: [Piping Engineering Note](#)
- [FESHM 5031.5: Low Pressure Vessels and Fluid Containment](#)
- [FESHM 5032: Cryogenic System Review](#)
 - Form: [Failure Mode and Effect Analysis](#)
- [FESHM 5032.1: Liquid Nitrogen Dewar Installation and Operation Rules](#)
- [FESHM 5033: Vacuum Vessel Safety](#)
 - Form: [Vacuum Vessel Engineering Note](#)
- [FESHM 5034: Pressure Vessel Testing](#)
 - Form: [Pressure Testing Permit](#)

Other Relevant FESHM Chapters:

- [FESHM 1080: Environment, Safety & Health Requirements for Experimenters](#)
- [FESHM 2100: Fermilab Energy Control Program \(Lockout/Tagout\)](#)
 - Form: [Fermilab General LOTO Procedure](#)
- [FESHM 4130: Personal Protective Equipment \(PPE\)](#)
- [FESHM 4140: Hearing Conservation](#)
- [FESHM 4150: Respiratory Protection](#)
 - Form: [Medical Surveillance Request for Respiratory Protection Usage](#)
- [FESHM 4230: Confined Spaces](#)
 - Form: [Confined Space Entry Permit](#)
 - Form: [Confined Space Reclassification](#)
- [FESHM 4260: Lasers](#)
 - Form: [Laser Registration Form](#)
- [FESHM 6020.2: Welding, Burning, Brazing and Spark Producing Operations](#)
- [FESHM 7060: Fall Protection](#)
- [FESHM 7070: Ladder & Scaffold Safety](#)

- [FESHM 9100: Fermilab Electrical Safety Program](#)
- [FESHM 9110: Electrical Utilization Equipment Safety](#)
- [FESHM 9130: Management and Use of Cable Tray Systems](#)
- [FESHM 9140: Protection Against Exposed Electrical Bus](#)
- [FESHM 9150: High Voltage Coaxial Connectors](#)
- [FESHM 9160: Low Voltage, High Current Power Distribution](#)
- [FESHM 9170: Uninterruptible Alternating Current Power Back-Up Systems](#)
- [FESHM 9190: Grounding Requirements for Electrical Distribution and Utilization Equipment](#)
- [FESHM 10110: Below-The-Hook Lifting Devices](#)
 - Form: [Below-The-Hook Lifting Device Engineering Note](#)
- [FESHM 10180: Aerial Lifts](#)

Installation personnel training

- New Employee/User ESH&Q Orientation (FN000034/CR/00)
 - Can be completed online if personnel have a Fermi ID #
 - http://www-esh.fnal.gov/pls/default/schedule.show_course_details?cid=344
- Confined spaces (FN000003/CR/00)
 - http://www-esh.fnal.gov/pls/default/schedule.show_course_details?cid=546
- Fall protection orientation (FN000304/CR/01)
 - http://www-esh.fnal.gov/pls/default/schedule.show_course_details?cid=636
- Aerial/scissor lift training (FN000532/CR/01)
- Compressed gas cylinder safety (FN000213/CR/00)
 - http://www-esh.fnal.gov/pls/default/schedule.show_course_details?cid=545
- Pressure safety orientation (FN000271/CR/00)
 - Can be completed online if personnel have a Fermi ID #
 - http://www-esh.fnal.gov/pls/default/schedule.show_course_details?cid=454
- Cryogenic safety (FN000115/CR/01)
 - Can be completed online if personnel have a Fermi ID #
 - http://www-esh.fnal.gov/pls/default/schedule.show_course_details?cid=5899
- Large Portable Liquefied Gas Dewar Handling (FN000475/OJ/01)
- Scaffolding – Competent Person (at least 1) (FN000389/CR/01)
- Tech shop safety (FN000258/CR/00)
- Electrical safety in the workplace (NFPA 70E)? (FN000385/CR/01)
 - http://www-esh.fnal.gov/pls/default/schedule.show_course_details?cid=3566
- Lockout/Tagout Level 2? (FN000212/CR/00)
 - http://www-esh.fnal.gov/pls/default/schedule.show_course_details?cid=136
- Hearing conservation? (FN000154/CR/00)
 - http://www-esh.fnal.gov/pls/default/schedule.show_course_details?cid=97
- Respiratory protection? (FN000024/CR/00)
 - http://www-esh.fnal.gov/pls/default/schedule.show_course_details?cid=553